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ABSTRACT

The study investigated whether significant differences resulted from a bilingual-bicultural reading program as compared to the results of a traditional monolingual reading program. During the third spring semester of a four year bilingual project, 86 third, 84 fifth, and 96 eighth grade bilingual Mexican American students from the same South Texas public school district were tested using the reading tests produced by the Guidance Testing Associates (GTA) and the Comprehensive Test of Basic Skills, Form Q (CTBS/Q). Only the portion of the CTBS/Q which measured English reading performance was selected, while the entire GTA, in both its English and Spanish versions, was used. The GTA instruments were specifically tailored to Texas youth; the CTBS/Q was not designed for any particular culture or group. Only the subtests for vocabulary and comprehension were compared from both tests. Multiple regression equations structured with independent variables distributed equally among treatment and control groups and various analyses of variance and of covariance were used. Findings included: generally both treatment and control students in the 3rd and 5th grades ranked higher in Spanish than in English reading when examined in terms of particular group performance; although the treatment 8th grade students were higher in GTA vocabulary and CTBS/Q comprehension, they lagged behind the control students in CTBS/Q vocabulary and GTA comprehension. (NQ)

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An Assessment of the Reading Performance of Bilingual Mexican American Children

June 1976

I. Thomas Holleman, Jr.
Development Associates, Inc.

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ABSTRACT

Third, fifth, and eighth grade students were tested in the third spring semester of a four year bilingual project. All students were bilingual Mexican Americans sampled from four elementary and two junior high schools in the same South Texas public school district. Students from three of the schools were enrolled in bilingual treatment classes, the remainder in traditional monolingual reading programs in the three control schools. The research question focused upon whether significant results accrued from a bilingual reading program as opposed to the results expected from a conventional and traditional monolingual reading program.

A high correlation between test scores and the ability to read has consistently been the norm found in educational research. Unfortunately, when bilingual Mexican American students have been tested, this truism remains. Low reading ability has meant low test scores for the average Mexican American. According to a noted Mexican American educator, these students' linguistic and cultural differences, coupled to doubtful testing procedures have "stigmatized" the student and "impeded his growth and have placed him in a group which is barred from full effectiveness and success" (2, p. 105).

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Research Question and Instrumentation

The crux of the problem appears to rest upon providing Mexican American students with learning situations which can remedy the detractions from academic growth and success. When placed in a structured learning environment that intertwines their culture and language with that of the status quo, the question arises on an a posteriori basis, do significant results accrue from such a program as opposed to the results expected from a conventional and traditional monolingual program? Since a short study could not begin to cover all aspects of the phenomenology of this question, some of the more important aspects were assayed in terms of reading performance only. This study thus investigated whether or not significant differences resulted from a bilingual-bicultural reading program as compared to the results of a traditionally oriented approach.

The outcomes of both monolingual and bilingual reading programs were measured by two validated instruments. They were the reading tests produced by the Guidance Testing Associates (GTA) and the Comprehensive Test of Basic Skills, Form Q (CTBS/Q) (1, 3). For the purpose of this study, only the portion of the CTBS/Q which measured English reading performance was selected, while the entire GTA, in both its English and Spanish versions, was utilized. The Guidance Testing Association instruments were specifically tailored to Texas youth and the norm group

included many Mexican Americans. The CTBS/Q was not designed with any particular culture or group in mind.

The research was divided into two parts. In the first, the CTBS/Q was administered in April 1975 to a sample, then in May 1975, the GTA was administered first in English, then, two weeks later in Spanish to the same sample. Each grade selected was administered the appropriate level of each test. Since the CTBS/Q did not contain a subtest for measuring the speed of comprehension, only the subtests for vocabulary and comprehension were compared from both instruments. The scores for the two subtests were summed and the total scores also included in the analyses. All raw scores were compiled by simply summing the number of correct answers. In the first set of analyses, all raw scores were converted to Z-scores, then to T-scores for final consideration. The second part of the research involved comparison of all three subscores plus the final scores of the GTA in the English and Spanish versions; only raw scores were used in this part. Since the same test was utilized, it was not necessary to standardize the scores prior to the analyses.

Sample

This bilingual project was conducted in an urban school district in southern Texas. Beginning in 1971, its purpose was to provide innovative curricula and instructional methodologies to a municipal public school district whose

student body was composed of ninety-three percent Mexican American children. The program did not extend to all of the children; ten schools out of twenty-seven in the district were selected for the project and only these treatment schools received special funds. For this study, three of the project schools were selected for testing, and three non-project schools were selected for control. Four were elementary and the other two were junior high schools. The average sample size in each bilingual class was twenty-two in all elementary classrooms and eighteen in the junior high classrooms. In order to be included in the sample, students must have taken the total battery of exams being studied. Other students were excluded even though they might have completed an exam in a selected classroom. Grade levels three and five were chosen from the elementary schools and grade eight from the junior high schools. One third and one fifth grade classroom were tested in each elementary school; three eighth grade classrooms from each junior high school were tested.

Methodology

A fixed-effect model was used for each standard multiple regression equation. The model was fixed in terms of the criteria of the same students being analyzed across tests, i.e., each student must have taken both the GTA and the CTBS/Q. Each cell in the cross-classification among factors had exactly the same number of cases and all factor

effects were orthogonal in basic concept of experimental design. Only metric dependent/independent variables were included in the equation, allowing each to function in accordance with usual multiple regression techniques. Previous to the aggregate analyses, one-way ANOVAS and analyses of covariance were run in order to define any masking effects among variables and strong interaction effects within groups. Scatterplots were used to examine linearity.

Besides the significance tests that were made according to these groupings, the overall and specific pattern of effects of the independent variables to the criterion variable was examined via several statistics. These statistics, named in summary tables later in the study, accompanied each multiple regression computer run and were consulted in all analyses.

In sum, each multiple regression equation utilized was structured with independent variables distributed equally among treatment and control school classroom categories. T-scores or raw scores, derived from the GTA-CTBS/Q total scores and computed by a simple count of all correct answers, quantified each dependent variable. Each independent variable, in turn, was quantified by either T-scores or raw scores taken from the corresponding GTA-CTBS/Q subtests. Various ANOVAS and analyses of covariance were run in order to define reasons for variances among and within the different tests.

STATISTICAL ANALYSES AND DISCUSSIONS

Part I: English GTA versus CTBS/Q

English GTA versus CTBS/Q: Grade Eight

The research question for each grade focused upon whether or not significant differences in English reading performance resulted from the treatment reading program as compared to the results of the comparison reading program. Reading performance for both groups was measured by the CTBS/Q and GTA reading tests. Correspondingly, the null hypothesis tested was:

> There are no significant differences between the results of treatment and control reading programs as measured by the scores on the reading subtests of the GTA and CTBS/Q instruments.

The samples incorporated in the fixed model consisted of 48 treatment and 48 control students tested for a total of 96 in the eighth grade study. This sample represented over thirty percent of the eighth grade students of both junior high schools tested. Table 1 shows the overall results of the regression analysis.

Table 1. Aggregate Statistics and Analysis of Variance for Eighth Grade Reading: GTA versus CTBS/Q

		Analysis of Variance	DF	Sum of Squares	Mean Square	F
Mult R	= 0.97653					
R^2	= 0.95362	Regression	8	83300.288	10412.536	223.594*
Adj R^2	= 0.94550	Residual	87	4051.524	46.569	
S Error	=10.19241	*Significance 0.01				

The null hypotheses were not retained as the F ratio gave a 0.01 level of significance. That gave a high degree of assurance that it was likely that the treatment and control eighth grade test scores were different. The R^2 of 0.95362 indicated that of the variation in reading performance, approximately 95% was attributable to the joint operation of vocabulary and comprehension of both treatment and control students. However, this high R^2 figure (≥ 0.8) indicated that an extreme degree of collinearity existed between the dependent and independent variables. Unstandardized B coefficients of regression were thus used for specific weighting of each independent variable.

In Table 2, the reasons for rejecting the null hypothesis are evident. First, the treatment B coefficients of regression were much higher than that of control classes in GTA vocabulary, but much lower than the control B coefficients of regression for comprehension on the same instrument. In

Table 2. Multiple Regression Results for Eighth Grade Reading: GTA versus CTBS/Q

Group	Test	Variable	R^2	R^2 Change	B	SD
TREAT	GTA	Vocabulary	0.47047	0.47047	1.02486	11.2708
		Comprehension	0.47144	0.00097	0.89364	11.3193
	CTBS/Q	Vocabulary	0.58001	0.10857	0.93529	9.7008
		Comprehension	0.60935	0.02934	1.41087	9.9822
CONT	GTA	Vocabulary	0.78019	0.17084	0.79729	8.9133
		Comprehension	0.83740	0.05721	1.11112	9.8249
	CTBS/Q	Vocabulary	0.94051	0.10310	1.20712	9.0104
		Comprehension	0.95362	0.01311	0.93215	7.9473

the CTBS/Q B coefficients, treatment was lower than control in vocabulary while it was higher in comprehension. The relationship of the B coefficients is summarized in Table 3.

Table 3: Comparison of B Coefficients of Regression for Eighth Grade Reading: GTA versus CTBS/Q

Group	Subtest	Contrast	Subtest	Group
T	GTA Vocabulary	>	GTA Vocabulary	C
R	CTBS/Q Vocabulary	<	CTBS/Q Vocabulary	O
E	GTA Comprehension	<	GTA Comprehension	N
A	CTBS/Q Comprehension	>	CTBS/Q Comprehension	T
T				

In sum, treatment students were higher than control students in GTA vocabulary and CTBS/Q comprehension. Treatment students, however, lagged behind control students in vocabulary as measured by the CTBS/Q and in comprehension as measured by the GTA. From the analysis of B regression coefficients, it can generally be concluded that the 0.01 significance level of the overall F ratio can no more be attributed to treatment than to control schools. This is evident from the split in compatability of test results revealed by the B coefficients.

The standard error of 10.19241 indicated the degree of predictability on the reading test scores, meaning that predicted scores might deviate as much as 10.2 points. The standard deviations supported this measure; the standard deviations for treatment CTBS/Q and comparison CTBS/Q-GTA

scores were closer in range than the corresponding standard deviations for treatment GTA scores. The difference lay in the high standard deviations in the treatment GTA scores. Overall, the control classes had lower standard deviations than the treatment classes.

English GTA Versus CTBS/Q: Grade Three

The null hypotheses were rejected because of the 0.01 significance level. This indicated a correspondingly high probability that the control reading students may have made significant advances in reading ability scores beyond those made by treatment students as a group. Table 4 contains the confirmation data.

Table 4: Aggregate Statistics and Analysis of Variance for Third Grade Reading: GTA versus CTBS/Q

Mult R = 0.99955	Analysis of Variance	DF	Sum of Squares	Mean Square	F
R^2 = 0.99911	Regression	8	91268.141	11408.518	10773.933*
Adj R^2 = 0.99893	Residual	77	81.533	1.0589	
S Error = 1.54856	*Significance 0.01				

The B coefficients of regression for all control GTA-CTBS/Q subtests were higher than the treatment score on corresponding subtests (see tables 5 and 6). The overall R^2 of 0.9991 indicated that approximately 99% of the variance in reading performance could be attributed to the independent variables. The standard error of only 1.54856

Table 5: Multiple Regression Results for Third Grade Reading: GTA versus CTBS/Q

Group	Test	Variable	R^2	R^2 Change	B	SD
TREAT	GTA	Vocabulary	0.61903	0.26676	0.18566	8.2492
		Comprehension	0.70580	0.08677	0.18464	9.5214
	CTBS/Q	Vocabulary	0.72053	0.01473	0.21953	9.5975
		Comprehension	0.74678	0.02625	0.18947	8.9180
CONT	GTA	Vocabulary	0.94414	0.19736	0.20543	9.8887
		Comprehension	0.96911	0.02497	0.23015	10.2288
	CTBS/Q	Vocabulary	0.99911	0.03000	0.23659	10.6214
		Comprehension	0.35226	0.35226	0.24250	11.6711

Table 6: Comparison of B Coefficients of Regression for Third Grade Reading: GTA versus CTBS/Q

Group	Subtest	Contrast	Subtest	Group
TREAT	GTA Vocabulary	<	GTA Vocabulary	CONT
	CTBS/Q Vocabulary	<	CTBS/Q Vocabulary	
	GTA Comprehension	<	GTA Comprehension	
	CTBS/Q Comprehension	<	CTBS/Q Comprehension	

also indicated that any predicted scores would deviate only about 1.5 points. In terms of the standard deviation, the treatment students, on both the GTA and CTBS tests, maintained the closest proximity to the mean.

English GTA versus CTBS/Q: Grade Five

The analysis of variance for grade 5 produced a low F ratio which was significant at the 0.05 level, but the null hypothesis was not retained (see Table 7). This

meant that there were statistically significant differences between the treatment and control students' reading scores as measured by the GTA-CTBS/Q tests. The degree of linearity given by R^2 was low in comparison to the high degree exhibited by the two previous analyses. Thus, the predictability of the regression equation is poor, considering the standard error of 77.22. The R^2 indicated that only approximately 20% of the overall variance was explained by the independent variables entered in the regression equation.

Table 7: Aggregate Statistics and Analysis of Variance for Fifth Grade Reading: GTA versus CTBS/Q

Mult R = 0.44984	Analysis of Variance	DF	Sum of Squares	Mean Square	F
R^2 = 0.20236	Regression	8	49915.044	6239.381	2.378*
Adj R^2 = 0.03814	Residual	75	196753.075	2623.374	
S Error = 77.21538	*Significant 0.05				

The standard deviations for all subtests for treatment and control students were in close proximity in terms of range, with the exception of the 14.67 standard deviation for the treatment GTA comprehension subtest (see Table 3). The highest B coefficients of regression also corresponded with the same treatment GTA comprehensive subtest, including vocabulary. The B coefficients for the same treatment students on the CTBS/Q comprehension subtest were much lower. Table 9 gives a profile of the B relationships. In all instances, each subtest score for treatment had a

greater B than the corresponding control subtest scores.

Table 8: Multiple Regression Results for Fifth Grade Reading: GTA versus CTBS/Q

Group	Test	Variable	R^2	R^2 Change	B	SD
TREAT	GTA	Vocabulary	0.13547	0.12414	1.29535	9.7267
		Comprehension	0.17183	0.03636	0.96653	14.6655
	CTBS/Q	Vocabulary	0.18968	0.01785	0.93940	9.0587
		Comprehension	0.19019	0.00052	0.31832	9.5438
CONT	GTA	Vocabulary	0.19510	0.00491	0.22664	9.0533
		Comprehension	0.20140	0.00630	0.83490	10.1694
	CTBS/Q	Vocabulary	0.20236	0.00096	0.44619	9.8704
		Comprehension	0.01132	0.01132	0.21281	10.1469

Table 9: Comparison of B Coefficients of Regression for Fifth Grade Reading: GTA versus CTBS/Q

Group	Subtest	Contrast	Subtest	Group
TREAT	GTA Vocabulary	>	GTA Vocabulary	CONT
	CTBS/Q Vocabulary	>	CTBS/Q Vocabulary	
	GTA Comprehension	>	GTA Comprehension	
	CTBS/Q Comprehension	>	CTBS/Q Comprehension	

Statistical Condensation

In all analyses for Part I, the null hypotheses were rejected. In terms of overall congruence of test results, this may have indicated that either the treatment or control school reading program was having a significant effect upon the reading ability of the bilingual students

in the schools sampled as measured by the CTBS/Q-GTA scores. On the other hand, within the framework of congruence, the non-acceptance of the null hypotheses could have meant that there was a combination of factors, possibly influencing the regression equations, which could be attributable to both treatment and comparison main effects of independent variables. A brief examination of all B coefficients of regression from each analysis combined into a frequency distribution table (see Table 10), gives an overview of the significant effects derived by the three previous analyses of grades 8, 3, and 5. However, it must be pointed out that these measures are not sufficient of themselves to be completely impartial indicators and predictors of program success.

Table 10: Frequency Distribution Table for all B Coefficients of Regression from the Eighth, Third and Fifth Grade Analyses

Group	Subtest	Contrast		Subtest	Group
		>	<		
T	GTA Vocabulary	2	1	GTA Vocabulary	C
R	CTBS/Q Vocabulary	1	2	CTBS/Q Vocabulary	O
E	GTA Comprehension	1	2	GTA Comprehension	N
A	CTBS/Q Comprehension	2	1	CTBS/Q Comprehension	T
T					

Table 10 shows an even total frequency split between treatment and control subtest weights. Each group outranked their counterparts at some point on each analysis, but not on an equal basis. Therefore, the overall split does

not follow compatability standards, i.e., student groups should score approximately the same on similar subtests. The treatment students outranked control students in GTA vocabulary and CTBS/Q comprehension but treatment lagged behind control in CTBS/Q vocabulary and GTA comprehension. However, the 5th grade treatment ranked above the corresponding control group in all categories, whether in GTA or CTBS/Q subscores (see Table 9). In the grade 3 analysis (see Table 6), compatability was also maintained with the exception that control always outranked the corresponding treatment group on all subtests - GTA or CTBS/Q. The split in the overall 6x6 frequencies was attributable only to the split in the compatability of exam results on the 8th grade level (see Table 3). In the case of the 8th grade, treatment ranked above control in vocabulary and in CTBS/Q comprehension.

For the purpose of confirming these results, ANOVAS were run which tested the significant differences between the scores of each subtest or total battery scores when regressed with their corresponding subtest or total battery scores. In all cases, a significance level of 0.001 was found between subtests and between total battery scores. When the factor of sex was added to group and entered each equation, no significant differences were found to exist because of the sex factor in any analysis within groups.

In summary, the GTA and CTBS/Q test results maintained their unique compatability in both 3rd and 5th grade

analyses, but failed to do so in the 8th grade analysis. This seemed to indicate a need for further research into the reliability of both testing instruments at the 8th grade level. The reliability of both CTBS/Q and GTA was apparently upheld in the 3rd and 5th grade analyses.

The original research question could not be answered with any reasonable certainty in this investigation. Since there was a distinct split in results, further research is necessary to assess the outcomes of treatment and control schools programs and their effects upon reading performance in the context of the Spanish and English languages and cultures. However, since treatment scores proved slightly superior in all areas for grade 5 and inferior in all areas for grade 3, this may have indicated that long run positive results could be derived through special structured bilingual-bicultural reading programs.

Part II: English GTA versus Spanish GTA

All items on both the English and Spanish GTA forms were identical and followed the same order and sequence by subtest. Since the tests were identical, raw scores were utilized as opposed to T-scores used on the previous analyses. The analyses of variance (ANOVAS) contrasted the total scores plus the scores on the complete series of GTA subtests: vocabulary, comprehension, and speed of comprehension. The same students were still divided into two groups, treatment and control, but were analyzed only

on the 3rd and 5th grade levels. The 8th grade was not administered the Spanish test. In addition, contrasts were made with the same students' test scores in terms of their sex.

Central to this segment of the investigation was the determination if there were significant differences between students' scores on the English and Spanish GTA's. Specifically, the focus of this research was upon the assessment of differences between (1) treatment student scores, and (2) control group student scores on the two reading tests.

Accordingly, the following null hypotheses were tested:

(1) There are no significant differences between the scores of treatment or control group students on the same English or same Spanish GTA subtests and total batteries.

(2) There are no significant differences between treatment and control group students' performances when compared across the English and Spanish GTA subtests and total batteries scores in terms of English to Spanish contrasts.

(3) The sex variable creates no significant differences in the scores of treatment and control group students on either English or Spanish subtests or total battery scores.

English GTA versus Spanish GTA: Grades Three and Five

As a preliminary search for clues, one-way ANOVAS were run which compared treatment and control student scores on the English to English GTA versus Spanish to Spanish GTA. They revealed statistically significant differences in only the Spanish vocabulary subtest (0.05) and total

battery scores (0.01) for the 3rd grade sample. In this instance, the difference arose because of a higher overall proportion of variance in the Spanish scores of the comparison students. A 0.7114 eta^2 for the vocabulary and a 0.8929 for the total battery comparison scores confirmed this assumption. The number of cases was 85 for the 3rd grade and 84 for the 5th grade. The null hypothesis was not retained in only this 3rd grade case.

However, when sex was added as a factor to group in investigating hypotheses (2) and (3), and analyses of covariance were made, statistically significant figures were derived for all analyses made between treatment and control male and female student scores among the same subtests but across languages, i.e., English to Spanish. As a variable, apart from group, sex registered no significant effects. The highest significance level derived

Table 11: Analysis of Covariance Results for Third Grade English Speed of Comprehension with Sex and Group as Factors and Spanish Speed of Comprehension as a Covariate

Source of Variation	Sum of Square	DF	Mean Square	F	Sign of F
Spanish Speed	1788.486	1	1788.486	127.375	0.001
Main Effects	95.565	2	47.782	3.403	0.037
Sex	11.750	1	11.750	0.837	0.999
Group	82.612	1	82.612	5.884	0.017
2-Way Interact.	58.486	1	58.486	4.165	0.042
Explained	1942.537	4	485.634	34.587	0.001
Residual	1137.328	81	14.041		
Total	3079.865	85	36.234		

for group on any analysis was 0.017 (see Table 11). The group difference was attributed primarily to the treatment students. The remaining analyses of covariance results are not discussed since their results are confirmed in the next section and showed no significant differences in main effects.

Aggregate Analysis of Overall English - Spanish Reading Performance

In addition to the various ANOVAS, several multiple regression analyses were made in order to ascertain the overall trend of reading performance. The subtest raw scores were examined in terms of the total effectiveness of the English and Spanish treatment and control reading programs as measured by the English and Spanish GTA total battery scores. Both English and Spanish test items were identical, and the results were analyzed in the context of the number of correct answers. Since no significant differences were found attributable to sex on the previous analyses, sex was omitted as a variable.

The following null hypothesis was tested:

> There are no significant differences between the scores of treatment and control students on the reading tests of the English and Spanish versions of the GTA in terms of overall reading performance.

English GTA versus Spanish GTA: Grade Three

The overall analysis of variance figures given in

Table 12 caused the null hypothesis to be rejected at the 0.01 level of significance. The R^2 of 0.99053 indicated that approximately 99% of the overall variance in reading performance as measured by the English and Spanish GTA's could be attributed to the independent variables of vocabulary, comprehension, and speed of comprehension. This was expected. The high degree of multicollinearity among the independent variables was also predictable on the basis of the previous analyses.

Table 12: Aggregate Statistics and Analysis of Variance for Third Grade Reading: English GTA versus Spanish GTA

	Analysis of Variance	DF	Sum of Squares	Mean Square	F
Mult R = 0.99525					
R^2 = 0.99053	Regression	12	164780.681	13731.723	636.081*
Adj R^2 = 0.98717	Residual	73	1575.924	21.588	
S Error = 7.24781	*Significance 0.01				

The standard error of 7.25 would give a 7 point interval of confidence if the results of this analysis were used in predicting future reading performance of the same sample. The standard deviation of the independent variables of the regression equation ranged from 5.25 to 8.93 (see Table 13). Treatment classrooms had nearly the same amount of standard deviation for both Spanish and English. The same observation applies equally to the control classrooms, except that they had higher standard deviations on each corresponding

independent variable.

Table 13: Multiple Regression Results for Third Grade Reading: English GTA versus Spanish GTA

Group	Test	Subtest	R^2	R^2 Change	B	SD
TREAT	GTA English	Vocabulary	0.67238	0.25906	1.05684	8.1101
		Comprehension	0.74064	0.06825	0.59343	7.3140
		Speed	0.77372	0.03308	1.01817	5.2496
	GTA Spanish	Vocabulary	0.81347	0.03975	1.15228	8.0046
		Comprehension	0.83392	0.02045	1.07685	7.5010
		Speed	0.86452	0.03060	1.77188	5.5819
CONT	GTA English	Vocabulary	0.95861	0.09409	1.03688	8.9337
		Comprehension	0.97639	0.01778	1.13853	8.0891
		Speed	0.97962	0.00323	0.71946	6.4485
	GTA Spanish	Vocabulary	0.98702	0.00740	0.92913	8.6503
		Comprehension	0.99053	0.00350	1.26930	8.4482
		Speed	0.41332	0.41332	0.65892	6.0927

The B coefficients of regression give the specific reasons for the 0.01 level of statistical significance produced by the overall F ratio. Table 14 provides a summary of the B coefficients relations. In all cases, whether in Spanish or English vocabulary and speed of comprehension, control students had the lower B coefficients. However, control students had higher B coefficients on both Spanish and English comprehension than did their treatment counterparts.

Table 14: Comparison of B Coefficients of Regression for Third Grade Reading: English/Spanish GTA Treatment versus English/Spanish Control

Group	GTA Subtest	Contrast	GTA Subtest	Group
TREAT ENGLISH	Vocabulary	>	Vocabulary	CONT ENGLISH
	Comprehension	<	Comprehension	
	Speed	>	Speed	
TREAT SPANISH	Vocabulary	>	Vocabulary	CONT SPANISH
	Comprehension	<	Comprehension	
	Speed	>	Speed	

Grade Three: Aggregate Statistical Discussion

The fact that treatment students ranked higher than control students in both Spanish and English vocabulary and speed of comprehension subtests of the GTA appeared to support higher treatment results. However, since control students ranked higher in comprehension and lower on the other two subtests, a firm conclusion could not be reached that treatment produced better test results for bilingual students at this grade level. At best, the test results give cause for reviewing the treatment reading program, for if control students could score just as well or higher than their counterpart treatment students, especially in Spanish and English comprehension, the additional expense of providing such a non-traditional reading program seems dubious. A cost-benefit analysis would barely support

treatment in this context. The only strong support for treatment, according to this part of the analyses, could be found in its dominance in the speed subtests. This could mean that the treatment program did produce a faster comprehension rate as measured by the CTBS/Q-GTA reading tests.

English GTA versus Spanish GTA: Grade Five

The null hypotheses could not be accepted from this analysis of variance at the 0.01 level of significance (see Table 15). Moreover, the low R^2 of 0.56816 meant that

Table 15: Aggregate Statistics and Analysis of Variance for Fifth Grade Reading: English GTA versus Spanish GTA

	Analysis of Variance	DF	Sum of Squares	Mean Square	F
Mult R = 0.75377					
R^2 = 0.56816	Regression	12	254249.55	21187.46	7.785*
Adj R^2 = 0.40982	Residual	71	193244.92	2721.759	
S Error = 81.63099	*Significance 0.01				

only approximately 57% of the overall variance in reading performance could be attributed to the independent variables. Much of this problem arose from a drop in the scores, primarily on vocabulary, and higher scores in comprehension. This might be attributed to a change in levels of the GTA exams. This phenomenon produced several negative B coefficients of regression. Thus, each B

coefficient was standardized into Beta weights because of the diversities in scores and consequent weighting problems involved.

The high standard error of 81.631 ruled out any confidence in the predictability from the equation. The standard deviations of each independent variable were also as erratic as the scores they represented (see Table 16). These differences in scores, standard deviations, and Beta weights negated the possibility of multicollinearity existing as it did in most equations (the low R^2 also confirmed this).

Table 16: Multiple Regression Results for Fifth Grade Reading: English GTA versus Spanish GTA

Group	Test	Subtest	R^2	R^2 Change	Beta	SD
TREAT	GTA English	Vocabulary	0.17658	0.02983	-0.16725	5.3672
		Comprehension	0.17896	0.00238	-0.07352	7.4970
		Speed	0.21760	0.03864	0.26790	5.2614
	GTA Spanish	Vocabulary	0.23681	0.01921	0.18543	3.5421
		Comprehension	0.25069	0.01387	0.20903	6.3315
		Speed	0.25356	0.00287	-0.02307	2.8717
CONT	GTA English	Vocabulary	0.30925	0.05569	-0.26092	5.7339
		Comprehension	0.32327	0.01402	-0.31747	7.0868
		Speed	0.48928	0.16601	0.73471	4.4828
	GTA Spanish	Vocabulary	0.50468	0.01541	0.09592	5.1918
		Comprehension	0.56816	0.06348	0.37960	5.8164
		Speed	0.14675	0.14675	0.03432	3.6144

An examination of Table 17 shows why there was a significant statistical difference in the independent variables. Most important in the differences was that treatment students ranked highest in English vocabulary and comprehension

and in Spanish vocabulary while falling behind the control students' Beta weights in English speed and Spanish comprehension and speed.

Table 1: Comparison of B Coefficients of Regression for Fifth Grade Reading: English/Spanish GTA Treatment versus English/Spanish GTA Control

Group	GTA Subtest	Contrast	GTA Subtest	Group
TREAT ENGLISH	Vocabulary	>	Vocabulary	CONT ENGLISH
	Comprehension	>	Comprehension	
	Speed	<	Speed	
TREAT SPANISH	Vocabulary	>	Vocabulary	CONT SPANISH
	Comprehension	<	Comprehension	
	Speed	<	Speed	

Grade Five: Aggregate Statistical Discussion

The 5th grade results differed somewhat from the aggregate analysis of the 3rd grade English-Spanish GTA. The treatment students ranked slightly higher again in both English and Spanish vocabulary, and again, the treatment Spanish comprehension was slightly lower than that of the control group. But there the similarity ceased. Treatment English 5th grade comprehension was greater than for corresponding control students although the treatment speed of comprehension in both Spanish and English was lowest.

For 5th grade treatment classes to rank higher in English vocabulary and comprehension while maintaining the higher rank in Spanish vocabulary seemed to indicate a significant progression in English reading performance. That Spanish speed of comprehension scores for treatment 5th graders, in this instance, were lower relative to that of 3rd graders, may indicate less emphasis on Spanish in the treatment program on this higher elementary level. As measured by the GTA, the treatment program appeared to be achieving some positive significant results in reading performance at the 5th grade level. However, both groups maintained higher rankings on Spanish than on English reading performance.

Implications of the Study

The Part I - Statistical Condensation and the Part II - Statistical Discussions summarize the results of particular analyses. The following are itemizations of specific implications that can be drawn from the entire study:

- The GTA and CTBS/Q reading subtests results proved compatable on the 3rd and 5th grade levels (i.e., the same subtests produced compatable results not opposite results).
- The GTA and CTBS/Q reading subtests' results did not prove compatable on the 8th grade level.
- In the lower grade level, treatment curriculum and instructional methodology lagged in terms of desired

effectiveness in vocabulary and comprehension, i.e., significant advances beyond control schools educational outcomes as measured by the English GTA-CTBS/Q 3rd grade study. However, in the higher elementary grade levels, students in the treatment classes achieved higher positive educational outcomes in the areas of vocabulary and comprehension as measured by the English GTA-CTBS/Q study. Unfortunately, this 5th grade aggregate study was not substantiated at the 0.01 but at the 0.05 level of significance. This placed some restrictions upon the acceptability of this program.

·The analysis of the 3rd grade English and Spanish outcomes as quantified by the GTA did not give strong support for one methodology above the other. However, it can be noted that treatment 3rd grade students performed better on both the English and Spanish subtests for vocabulary and speed, but lower in English and Spanish comprehension than their control schools counterparts, but the differences were small.

·In the 5th grade GTA English/Spanish study, the treatment 5th graders achieved positive significant results in English vocabulary and comprehension while maintaining the highest rank in Spanish vocabulary. This appeared to indicate some success for treatment in the acculturation process.

·In both 3rd and 5th grades, compatability of test results was generally evident in the analysis of GTA

subtests when contrasted in terms of English to English and Spanish to Spanish. The only exception in compatability of test results was in the comprehension subtests when the treatment 5th grade group scored higher than control in the Spanish version of the GTA.

·Overall, generally both treatment and control students in the 3rd and 5th grades ranked higher in Spanish than they did in English reading when examined in terms of particular group performance. This can only indicate that Spanish basically remained the dominant language of the students tested at the early grades. In addition, both female and male students generally scored higher in Spanish than in English.

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